CLAIMS

What is claimed is:

1. A method for isolating and storing nucleic acid, comprising:

a. providing a solid phase medium;

b. applying a sample comprising cells containing nucleic acid to the solid phase medium;

c. retaining the cells with the solid phase medium as a cellular retentate and removing contaminants;

d. contacting the cellular retentate with a solution comprising a surfactant or detergent;

e. lysing the cellular retentate to form a cell lysate while retaining the cell lysate in the medium, the cell lysate comprising the nucleic acid;

f. drying the solid phase medium with the cell lysate comprising the nucleic acid; and

g. storing the dried solid phase medium with the nucleic acid.

2. The method of claim 1, wherein, prior to drying step f, the solid phase medium with the nucleic acid is washed to remove contaminants while retaining the nucleic acid in the solid phase medium.

3. The method of claim 1, wherein the dried solid phase medium with the nucleic acid in step g is maintained substantially at a temperature of 5°C to 40°C.

4. The method of claim 1, further comprising:

h. eluting the nucleic acid from the solid medium.

5. The method of claim 4, wherein, prior to eluting step h, the dried solid phase medium with the nucleic acid is washed to remove contaminants while retaining the nucleic acid in the solid phase medium.

6. The method of claim 4, wherein the storage of the nucleic acid in step g has a duration of at least one week.

7. The method of claim 4, wherein the storage of the nucleic acid in step g has a duration of at least one month.

8. The method of claim 4, wherein the storage of the nucleic acid in step g has a duration of at least three months.

9. The method of claim 4, wherein the storage of the nucleic acid in step g has a duration of at least five months.

10. The method of claim 1, wherein the solid phase medium comprises a filter comprising a plurality of fibers.

11. The method of claim 10, wherein the filter has a substantially disordered structure.

12. The method of claim 10, wherein the fiber diameters are in the range of from 1 μm to 10 μm.

13. The method of claim 10, wherein the filter comprises one or more pores having a pore size from about 0.2 μm to about 2.7 μm.

14. The method of claim 1, wherein the solid phase medium comprises:

a. a glass or silica-based solid phase medium;

b. a plastics-based solid phase medium; or

c. a cellulose-based solid phase medium.

15. The method of claim 1, wherein the solid phase medium is selected from one of the following: glass, glass fiber, glass microfiber, silica, silica gel, silica oxide, cellulose, nitrocellulose, carboxymethylcellulose, polyester, polyamide, carbohydrate polymers, polypropylene, polytetrafluoroethylene, polyvinylidinefluoride, wool, or porous ceramics.

16. The method of claim 1, wherein the surfactant or detergent of step d comprises an anionic surfactant or detergent.

17. The method of claim 16, wherein the anionic surfactant or detergent comprises sodium dodecyl sulfate.

18. The method of claim 17, wherein the concentration of the sodium dodecyl sulfate is between about 0.5% and about 5% weight/volume.

19. The method of claim 16, wherein the solution of step d further comprises:

ii. a weak base; and

iii. a chelating agent.

20. The method of claim 19, wherein the solution of step d further comprises:

iv. uric acid or a urate salt.

21. The method of claim 1, wherein the cellular retentate comprises condensed material from the nucleus.

22. The method of claim 1, wherein the cellular retentate comprises intact whole cells and wherein step e comprises:

i. rupturing the intact whole cells retained by the solid phase medium to leave condensed material from the nucleus retained by the medium; and

ii. lysing the condensed material from the nucleus to form the cell lysate containing the nucleic acid.

23. The method of claim 1, wherein the composition and dimensions of the solid phase medium are selected so that the nucleic acid is retained by the medium in step e substantially by non-ionic interactions.

24. The method of claim 23, wherein the non-ionic interactions comprise dipole-dipole interactions, dipole-induced dipole interactions, dispersion forces, or hydrogen bonding.

25. The method of claim 1, wherein the retaining step e is further defined as physically retarding the movement of the nucleic acid through the solid phase medium.

26. The method of claim 1, wherein the solid phase medium is capable of retaining the cells and the nucleic acid in the absence of a chaotrope.

27. The method of claim 1, wherein step b further comprises concentrating the cells in the solid phase medium.

28. The method of claim 4, wherein the nucleic acid is heated to an elevated temperature of 65°C to 125°C prior to eluting step h.

29. The method of claim 4, wherein the nucleic acid is heated to an elevated temperature of 80°C to 95°C prior to eluting step h.

30. The method of claim 1, wherein the cells are selected from the group consisting of white blood cells, epithelial cells, buccal cells, tissue culture cells, semen, vaginal cells, urinary tract cells, plant cells, bacterial cells, and colorectal cells.

31. The method of claim 1, wherein the cells are white blood cells and the method further comprises applying whole blood to the solid phase medium, optionally lysing the red blood cells therefrom, optionally washing the solid phase medium to remove contaminants, and obtaining the cell lysate from the white blood cells.

32. The method of claim 1, wherein the sample comprises blood cells and the dimensions of the solid phase medium are selected so that the majority of the cells retained in step c comprise white blood cells.

33. The method of claim 1, wherein the nucleic acid comprises DNA or RNA.

34. The method of claim 1, wherein the nucleic acid comprises genomic DNA.

35. A method for isolating and storing nucleic acid, comprising:

a. providing a solid phase medium;

b. applying a sample comprising cells containing nucleic acid to the solid phase medium;

c. retaining the cells with the solid phase medium as a cellular retentate and removing contaminants;

d. contacting the cellular retentate with a solution comprising:

i. a weak base;

ii. a chelating agent; and

iii. an anionic surfactant or detergent;

e. lysing the cellular retentate to form a cell lysate while retaining the cell lysate in the medium, the cell lysate comprising the nucleic acid;

f. drying the solid phase medium with the cell lysate comprising the nucleic acid;

g. storing the dried solid phase medium with the nucleic acid; and

h. eluting the nucleic acid from the solid phase medium.

36. The method of claim 35, wherein, prior to drying step f, the solid phase medium with the nucleic acid is washed to remove contaminants while retaining the nucleic acid in the solid phase medium.

37. The method of claim 35, wherein, prior to eluting step h, the dried solid phase medium with the nucleic acid is washed to remove contaminants while retaining the nucleic acid in the solid phase medium.

38. The method of claim 1, wherein the dried solid phase medium with the nucleic acid in step g is maintained substantially at a temperature of 5°C to 40°C.

39. The method of claim 35, wherein the storage of the nucleic acid in step g has a duration of at least one week.

40. The method of claim 35, wherein the storage of the nucleic acid in step g has a duration of at least one month.

41. The method of claim 35, wherein the storage of the nucleic acid in step g has a duration of at least three months.

42. The method of claim 35, wherein the storage of the nucleic acid in step g has a duration of at least five months.

43. The method of claim 35, wherein the solution of step d further comprises:

d. uric acid or a urate salt.

44. The method of claim 35, wherein the solid phase medium comprises a filter comprising a plurality of fibers.

45. The method of claim 44, wherein the filter has a substantially disordered structure.

46. The method of claim 44, wherein the fiber diameters are in the range of from 1 μm to 10 μm.

47. The method of claim 44, wherein the filter comprises one or more pores having a pore size from about 0.2 μm to about 2.7 μm.

48. The method of claim 35, wherein the solid phase medium comprises:

a. a glass or silica-based medium;

b. a plastics-based medium; or

c. a cellulose-based medium.

49. The method of claim 35, wherein the solid phase medium is one of the following: glass, glass fiber, glass microfiber, silica, silca gel, silica oxide, cellulose, nitrocellulose, carboxymethylcellulose, polyester, polyamide, carbohydrate polymers, polypropylene, polytetrafluoroethylene, polyvinylidinefluoride, wool, and porous ceramics.

50. The method of claim 35, wherein the anionic surfactant or detergent comprises sodium dodecyl sulfate.

51. The method of claim 50, wherein the concentration of the sodium dodecyl sulfate is between about 0.5% and about 5% weight/volume.

52. The method of claim 35, wherein the cellular retentate comprises condensed material from the nucleus.

53. The method of claim 35, wherein the cellular retentate comprises intact whole cells and wherein step e comprises:

i. rupturing the intact whole cells retained by the solid phase medium to leave condensed material from the nucleus retained by the solid phase medium; and

ii. lysing the condensed material from the nucleus to form the cell lysate containing the nucleic acid.

54. The method of claim 35, wherein the composition and dimensions of the solid phase medium are selected so that the nucleic acid is retained by the medium in step e substantially by non-ionic interactions.

55. The method of claim 54, wherein the non-ionic interactions comprise dipole-dipole interactions, dipole-induced dipole interactions, dispersion forces, or hydrogen bonding.

56. The method of claim 35, wherein the retaining step e is further defined as physically retarding the movement of the nucleic acid through the medium.

57. The method of claim 35, wherein step b further comprises concentrating the cells on the solid phase medium.

58. The method of claim 35, wherein the solid phase medium is capable of retaining the cells and the nucleic acid in the absence of a chaotrope.

59. The method of claim 35, wherein the nucleic acid is heated to an elevated temperature of 65°C to 125°C prior to eluting step h.

60. The method of claim 35, wherein the nucleic acid is heated to an elevated temperature of 80°C to 95°C prior to eluting step h.

61. The method of claim 35, wherein the cells are selected from the group consisting of white blood cells, epithelial cells, buccal cells, tissue culture cells, semen, vaginal cells, urinary tract cells, plant cells, bacterial cells, and colorectal cells.

62. The method of claim 35, wherein the cells are white blood cells and the method further comprises applying whole blood to the solid phase, optionally lysing the red blood cells therefrom, optionally washing the solid phase to remove contaminants, and obtaining the cell lysate from the white blood cells.

63. The method of claim 35, wherein the sample comprises blood cells and the dimensions of the solid phase medium are selected so that the majority of the cells retained in step b comprise white blood cells.

64. The method of claim 35, wherein the nucleic acid comprises DNA or RNA.

65. The method of claim 35, wherein the nucleic acid comprises genomic DNA.

66. A method for isolating and storing DNA, comprising:

a. providing a solid phase medium, wherein the solid phase medium comprises a filter comprising a plurality of fibers, wherein the fibers comprise:

i. glass or silica-based fibers;

ii. plastics-based fibers; or

iii. nitrocellulose or cellulose-based fibers;

b. applying a sample comprising cells containing DNA to the solid phase medium;

c. retaining the cells with the solid phase medium as a cellular retentate and removing contaminants;

d. contacting the cellular retentate with a solution comprising:

i. a weak base;

ii. a chelating agent; and

iii. an anionic surfactant or detergent;

e. lysing the cellular retentate to form a cell lysate while retaining the cell lysate in the medium, the cell lysate containing DNA;

f. drying the solid phase medium with the cell lysate comprising the DNA;

g. storing the dried solid phase medium with the DNA at a temperature of 5°C to 40°C;

h. heating the DNA with the solid phase medium to an elevated temperature of 65°C to 125°C; and

i. eluting the DNA from the solid phase medium.

67. The method of claim 66, wherein the storage of the DNA in step g has a duration of at least one week.

68. The method of claim 66, wherein the storage of the DNA in step g has a duration of at least one month.

69. The method of claim 66, wherein the storage of the DNA in step g has a duration of at least three months.

70. The method of claim 66, wherein the storage of the DNA in step g has a duration of at least five months.

71. The method of claim 66, wherein the fiber diameters are in the range of from 1 μm to 10 μm.

72. The method of claim 66, wherein the filter comprises one or more pores having a pore size from about 0.2 μm to about 2.7 μm.

73. The method of claim 66, wherein the solution of step d further comprises:

iv. uric acid or a urate salt.

74. The method of claim 66, wherein the cellular retentate comprises intact whole cells and wherein step e comprises:

i. rupturing the intact whole cells retained by the solid phase medium to leave condensed material from the nucleus retained by the medium; and

ii. lysing the condensed material from the nucleus to form the cell lysate containing the DNA.

75. The method of claim 66, wherein the composition and dimensions of the solid phase medium are selected so that the DNA is retained by the medium in step e substantially by non-ionic interactions.

76. The method of claim 66, wherein the anionic surfactant or detergent comprises sodium dodecyl sulfate at a concentration of between about 0.5% and about 5% weight/volume.